UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY (USGS)

INNOVATIVE PARTNERSHIPS FOR THE ACQUISITION, PREPARATION, AND/OR MAINTENANCE OF DIGITAL GEOSPATIAL DATA FOR THE PUBLIC DOMAIN

PROGRAM ANNOUNCEMENT 00HQPA0007
FISCAL YEARS 2001-2003

APPLICATION DATES FOR NEW PROPOSALS: November 30, 2000, April 30, 2001, November 30, 2001, April 30, 2002, November 30, 2002, and April 30, 2003

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INNOVATIVE PARTNERSHIPS FOR THE ACQUISITION, PREPARATION, AND/OR MAINTENANCE OF DIGITAL GEOSPATIAL DATA

I. PROGRAM DESCRIPTION AND REQUIREMENTS

A. Introduction

Using Innovative Partnerships (IPs), the U.S. Geological Survey (USGS), National Mapping Division (NMD) is working to collect, revise and maintain Digital Line Graphs (DLG), Digital Elevation Models (DEM), and Digital Orthophotoquads (DOQ) nationwide for entry into the public-domain national digital geospatial databases. These data are also referred to as vector, elevation and imagery. These products are captured from or referenced to USGS primary topographic series maps of the United States. The primary series includes quadrangle maps published at the scale of 1:24,000 (a limited number are 1:25,000) for the conterminous United States and Hawaii; they are at the scale of 1:63,360 for Alaska.

Since 1993 the IP program has proven successful in fostering a wide variety of partnerships with State and local agencies, Federally Recognized Indian Tribal Governments, academia, and the private sector for the production and acquisition of digital geospatial data. The requirements for IP support exceeds the NMD resources available, while the demand for current and accurate geospatial data has increased. Likewise, NMD data programs have been reoriented to support the National Spatial Data Infrastructure (NSDI) framework data collection and integration. Much of NSDI implementation concepts and the NMD strategic plan involve the ability to partner with the aforementioned entities. For these reasons, the NMD continues to encourage competitiveness in partnerships formed from this Program Announcement.

When evaluating new proposals and modifications to existing partnerships under the IP program, the NMD considers the relative overlap between the proposal's interest and existing requirements and obligations in the Division. Proposals, which support the development of a National Digital Geospatial Data Framework, including strategies for data maintenance, are of keen interest to the NMD. Also, proposals, which support the NMD program objectives and strategic plan, are considered valuable and worthwhile to the advancement of the National Mapping Program. NMD is obligated to the following specific goals and will consider these goals when evaluating proposals solicited under program announcement 00HQPA0007:

1.) The NMD participates fully in the development of the National Digital Geospatial Data Framework and provides national leadership for orthoimagery, elevation, and hydrography framework categories.

2.) The NMD will complete and maintain a suite of national data sets responsive to customer

priorities and requirements. Dates for selected components of this suite of national data sets are:

a.) By 2002, a system of policies, partnerships, and processes will be in place to maintain the quality and currentness of the National Hydrography Dataset (NHD).

b.) By 2004, digital ortho-imagery for the conterminous United States, Alaska, and Hawaii will be complete.

The following is the priority of NMD data products/themes for consideration under this announcement:

1.) Digital Orthophoto Quadrangles (DOQs)

a.) New coverage
b.) Update coverage

2.) Digital Elevation Models (DEMs)

a.) Replacement DEMs: Level 1 - Level 2 conversions
b.) Significant changes in topography

3.) Vector geospatial data:

Framework data/projects
National Hydrography Dataset (NHD)
Transportation
Digital Line Graph (DLG) data
Hydrography and data related towards NHD/framework
Transportation and data related towards framework
Hypsography and data related towards DEMs

A DOQ is a digitized image of an aerial photograph, corrected for displacements caused by camera angle and relief. The result is a spatially accurate image with planimetric features appearing in their true geographic positions. The standard primary series USGS DOQ is a quarter-quadrangle image (3.75- by 3.75-minutes). USGS DOQ's are derived from photography meeting National Aerial Photography Program (NAPP) specifications, and meet National Map Accuracy Standards for 1:12,000-scale quarter quadrangles. DOQ's adhere to the USGS NMPTI Standards for Digital Orthophotos (Attachment D).

DEM's are sampled arrays of elevation values representing ground positions at regularly spaced intervals. For the conterminous U.S. and Hawaii, primary series DEM's have been prepared at two levels: Level 1 - derived from manual profiling or image correlation of aerial photographic

stereomodels; Level 2 - derived from hypsography, either by digitizing USGS primary map contour separates or by stereomodel digitizing or its equivalent. The unit of coverage for DEM's in the conterminous U.S. is the 7.5-minute quadrangle. For Alaska, Level 2 DEM's are prepared from the hypsography overlays of the 1:63,360-scale Alaska primary series map, and the unit of DEM coverage is the Alaska primary series map. All DEM's adhere to the USGS NMPTI Standards for Digital Elevation Models (Attachment B).

DLG's are topologically structured vector data files representing map feature information appearing on USGS topographic maps: Boundaries; Hydrography; Transportation; Hypsography. DLG's also support other feature categories, but agreements initiated under this announcement will support those stated above: Boundaries; Hydrography; Transportation; Hypsography. DLG's are collected and archived as discrete digital files for each feature category. The unit of coverage for DLG's corresponds to the USGS primary series source map. DLG's adhere to USGS National Mapping Program Technical Instructions (NMPTI) Standards for Digital Line Graphs (Attachment A). USGS and the digital geospatial data community have acknowledged that vector data is evolving towards feature-based data. The development of the National Hydrography Dataset (NHD) has been a central focus for vector hydrography data; proposals that promote the development and enhancement of NHD data are encouraged. The NHD draft Standards for National Hydrography Dataset (Attachment C) are available for investigation, review, and/or implementation.

The USGS recognizes the potential public benefit of obtaining primary series DLG (including NHD), DEM, and DOQ data produced by State and local government agencies, public utilities, and private firms. Incorporating digital products prepared by these organizations into the USGS National Mapping Program reduces duplicative geospatial data collection in both the public and private sectors, and leverages Government funds in obtaining standardized digital geospatial data for entry into the public domain as part of a national spatial data infrastructure.

The intent of this announcement is to identify sources of accurate primary digital geospatial data being prepared by State and local government and private organizations to support their own mapping and geospatial data needs. The USGS will evaluate proposals to prepare the data to full USGS DLG, DEM, DOQ, NHD, or applicable and mutually agreed upon geospatial data standards for areas of the United States where coverage is lacking or outdated. The USGS will provide appropriated funds and/or other assistance through cooperative agreements with qualified applicants to obtain primary series digital data for public domain archiving and distribution.

The USGS is also interested in evaluating existing primary series vector data that can be converted to DLG and/or NHD standards by USGS, and in evaluating existing digital elevation data, and digital orthophotos that are compatible with USGS DEM, and DOQ standards and formats, or from which standard USGS products may be derived economically. Cooperative agreements to obtain existing digital geospatial data will be considered, provided the proposal is determined to benefit the National Mapping Program.

Proposals are invited from publicly funded State and local agencies, Federally Recognized Indian Tribal Governments, utilities, and private firms. Federal Government agencies are encouraged to contact the USGS National Mapping Division to pursue other options for collaborative map data production. Proposals from or work performed in foreign countries will not be considered.

This announcement does not solicit contractor support for specific USGS digital mapping requirements, nor is it intended to encourage speculative ventures by any potential applicant. This announcement is not a substitute for existing production mechanisms such as joint funding, work-share, and data exchange agreements; in many cases, these are more appropriate options for meeting the digital mapping and geospatial data needs of State and local organizations. Cooperative agreements established via this announcement are intended to compliment existing production mechanisms. It is suggested that potential proposers speak with USGS staff to understand its production planning process and the need for specific requirements during a particular fiscal year.

Proposals submitted under this announcement which potentially can lead to cooperative agreements must be determined by the USGS to be in the public interest and to comply with applicable public law. For example, law precludes the USGS from contributing more than one-half the total cost of any mapping project worked in cooperation with any State or local government agency. The USGS may either develop project-specific cost estimates or employ average product/category costs to determine the appropriateness of applicant cost proposals and their conformance with public law. Proposals are also evaluated competitively for costs, priority data requirements and USGS strategic direction.

All data obtained through cooperative agreements will be archived and distributed by the USGS as part of the public domain. No data in proprietary formats will be accepted unless the proprietary rights are waived to allow the data to be converted to USGS standards, then archived and distributed in public domain formats. An organization offering geospatial data in a proprietary format may place use restrictions to USGS on the supplied data, provided that the final derivative data (e.g. NHD, DEMs, DLGs, DOQ's, revised maps) are to be placed in the public domain without restrictions.

B. Cooperative Agreements to Prepare New DLG, DEM, or DOQ Data to USGS Standards (Element 1)

Element 1 cooperative agreements joined under this announcement will be for the purpose of preparing geospatial data to full USGS National Mapping Program standards or a mutually agreed upon format. Cooperators must also be able to produce appropriate level metadata for geospatial data delivered from agreements derived from this program announcement.

1.) DLG data for boundaries, hydrography (including NHD), transportation, and/or hypsography feature categories appearing on USGS primary topographic series maps of the United States. Standards for DLG's are contained in Section VA and in Attachment A. NHD Standards are available from the website indicated in Attachment C.

2.) Level 1 or Level 2 DEM's referenced to 7.5-minute (1:24,000- or 1:25,000-scale) primary series maps in the conterminous U.S.; Level 2 DEM's referenced to 15-minute, 1:63,360-scale primary maps in Alaska. Standards for DEM's are contained in Section V.B. and in Attachment B.

3.) DOQ's referenced to 3.75-minute (1:12,000-scale) quarter-quadrangles. Standards for DOQ's are contained in Section V.D. and in Attachment D.

Element 1 cooperative agreements are not intended to reimburse the basic costs for primary digital geospatial data being collected to meet the applicant's own mapping requirements. Potential cooperators should be preparing map data with strict attention to content and accuracy, and should be using state-of-the-art production hardware and software. The USGS is willing to defray only the additional incremental costs applicants would incur in preparing DLG, DEM, or DOQ data to full USGS standards. The incremental cost to USGS should, therefore, amount to less than one-half the total cost for USGS to prepare a standard digital map product in-house.

The USGS will support Element 1 cooperative agreements to prepare DLG, DEM, or DOQ data by providing any one or a combination of the following: USGS funds; scale-stable source materials; existing NAPP photographs; available field control; public domain software; training; processing/validation of cooperator data files; or other materials and services as mutually agreed upon. The USGS will maintain a quality assurance role during the course of any cooperative agreement to prepare digital data to USGS standards; quality of deliverables is expected to meet or exceed the quality demonstrated by sample digital data files provided by the proposer.

NOTE: Potential cooperators' proposals should anticipate or suggest, if needed, the possibility of producing overlapping data for a specific region, State, county, or other administrative boundary. For example - production of particular quadrangle or quadrangles that overlap in another State not involved in the proposed Innovative Partnership.

Element 1-proposal instructions are contained in Sections II.A, and II.B.

C. Cooperative Agreements to Obtain Existing Primary Series Digital Geospatial Data (Element 2)

The USGS also wishes to identify and evaluate existing sources of accurate vector data captured from USGS primary maps by other mapping organizations, and existing digital elevation data and digital orthophotos that either meet USGS standards or can be enhanced or resampled by USGS to generate standard USGS products economically. Existing primary vector data must be consistent with USGS DLG requirements for positional accuracy, feature content, attribute coding, file extent and format. Existing digital elevation data and digital orthophotos must meet USGS DEM, or DOQ requirements for accuracy, resolution, source suitability, file extent and format. Data obtained under this announcement will be archived in the public domain, national digital geospatial databases.

Applicants should be able to provide existing vector data files and digital elevation files in 7.5-minute USGS quadrangle coverages for the conterminous U.S., or in 1:63,360-scale USGS map coverages for Alaska. For digital orthophotos, applicants must be able to provide data files registered to 3.75-minute quadrangles.

The USGS may negotiate a fair and reasonable cost with the applicant in order to obtain technically acceptable data for the public domain. The additional effort required for USGS to convert existing data to full USGS standards will be a key factor in determining whether the data is of benefit to the USGS National Mapping Program, and whether the applicant's proposed cost to the Government is appropriate. Proposals to exchange existing primary vector data, elevation data or digital

orthophotos for archived USGS data of comparable value, and proposals to donate such data to the Government will also be considered as potential cooperative agreement options under Element 2.

Element 2 proposal instructions are contained in Sections III.A, and III.B.

D. Funding

Funding support for cooperative agreements resulting from this announcement will be provided from the USGS National Map and Digital Data Cooperative Program. It is anticipated that a maximum of $14,500,000 will be designated to support cooperative agreements during fiscal years 2001 through 2003, subject to the continued availability of appropriated funds. This estimate does not bind the USGS to a specific number of offers, awards, or to a specific amount of funding support for any agreement. It is anticipated that future proposal review dates will be advertised as they are established.

E. Award of Cooperative Agreements

Awards shall be made to applicants whose proposals conform to this announcement and are determined to be most advantageous to the USGS National Mapping Program. In selecting among acceptable proposals, awards will be made to the applicant(s) offering the greatest technical benefits at a fair and reasonable cost for the amount of funds available.

The USGS reserves the right to support any, all, or none of the proposals received and evaluated in response to this announcement. The USGS may limit the amount of work to be performed or data to be obtained through cooperative agreements joined under this announcement. USGS support for any out year of a proposed multi-year agreement will be contingent on the recipient's successful completion of work during the initial period of performance, and on continued availability of USGS funds. Should funding not be available for otherwise acceptable proposals, the USGS may hold said proposals with applicant concurrence for award at a later time when funding is available. For a given fiscal year as initial cooperative agreements are awarded, additional proposals may be considered, with support from potential late fiscal year funding.

F. Involvement Statement

Substantial involvement is anticipated between the USGS and the recipient through the terms of the cooperative agreement. In supporting a cooperative agreement under Program Announcement 00HQPA0007, the USGS is assisting the recipient's best efforts to provide quality digital geospatial data for the public benefit at a fair and reasonable cost.

The USGS will designate a project officer to facilitate technical assistance, to coordinate schedules, deliveries, and exchange of materials with the recipient, and to resolve recipient questions concerning technical standards and data transfer procedures.

G. General Application Instructions

1.) Application Issue and Closing Date. Application due dates are as follows: November 30, 2000,

April 30, 2001, November 30, 2001, April 30, 2002, November 30, 2002, and April 30, 2003. The final closing date of this announcement is April 30, 2003, 3:00 PM (See paragraphs 2.a. and 2.b.) Modifications to existing cooperative agreements requesting funding from a particular fiscal year can be submitted to the USGS Contracts Office after the application date, but should be sent by Aug 1, 2000.

2.) Application Delivery Instructions.

a.) Applications delivered by mail. (1) The applicant should use the bottom portion of the mailing list form (Attachment O) as the address label for its application. (The address is: U.S. Geological Survey, Office of Acquisition and Federal Assistance --MS205B, 12201 Sunrise Valley Drive, Reston, VA 20192.)

b.) Applications delivered by hand. (1) An application that is hand delivered shall be taken to the USGS, Office of Acquisition and Federal Assistance, Room 6A331, 12201 Sunrise Valley Drive, Reston, VA 20192. The Office of Acquisition and Federal Assistance will accept hand delivered applications between 7:45 a.m. and 4:15 p.m. daily, except Saturdays, Sundays and Federal holidays.

3.) Application Requirements.

a.) Cooperative agreement award recipients must comply with Attachment H, Special Terms and Conditions; and Attachment I, General Provisions.

b.) The applicant must conduct award activities. Subcontracting activities will be allowed.

c.) Applications for joint projects from two or more organizations will be considered for award, but applications should clearly define which tasks will be performed by which organization. However, only the lead organization will receive funding.

4.) Application Preparation Instructions.

Applicants shall submit an unbound; signed original and 1 stapled copy of the application. The application shall be assembled in the following order:

a.) Standard Form (SF) 424. Use the SF 424 (Attachment J) as the cover sheet for all applications. The SF 424 shall be signed by an individual authorized to commit the applicant.

b.) Table of contents.

c.) Abstract. The abstract should be no longer than three, single-spaced pages. It should contain an introduction (including identification of the element the application will address), background, purpose, and goals.

d.) Technical Proposal. See instructions under individual elements.

e.) Sample Digital Test File. All applicants are required to submit specific sample digital data files of the type proposed. The sample data files are to be submitted as part of the initial application package and are to be accompanied by sufficient written documentation for digital access/execution. Sample data will be evaluated for:

1.) Compatibility. The applicant's existing data should be compatible with USGS requirements for DLG's, DEM's, and DOQ's in regard to source materials, resolution, positional accuracy, feature content, attribute coding consistency, projection and datum, header information, file extent and output format as described in Sections V.A., V.B., and V.D.

Note: Sample elevation data files should be accompanied by a list of test points used to verify accuracy.

2.) Requirements. The extent to which the proposal supports USGS' documented mapping requirements will be assessed. Requirements from other agencies may be a significant factor in awarding agreements to obtain proposal data.

3.) Conversion Cost Evaluation. If the test sample data is found technically acceptable, the review panel will next address the applicant's cost proposal. A matrix will be used to determine the level of effort USGS would save by obtaining the applicant's data, and to estimate the additional effort required for USGS to convert the data to full DLG, DEM, or DOQ standards. From this information the USGS will develop an estimated valuation of the applicant's data to guide negotiations for obtaining the data for the public domain at a fair and reasonable cost.

f.) SF-424B.

Submit a SF 424B, Assurances Non-Construction (Attachment L) with the application package.

g.) Certifications for Federal Assistance.

Submit the required certifications with the application package. (Attachment P).

h.) Evaluation of Applications.

See Section II.C (for Element 1) and Section III.C (for Element 2).

II. ELEMENT 1: PROPOSALS FOR COOPERATIVE AGREEMENTS TO PREPARE NEW DLG, DEM, OR DOQ DATA

A. General Element 1 Instructions

1.) New data prepared under Element 1 cooperative agreements must meet the technical requirements appearing in: Section V.A. and Attachment A for DLG's; Section V.B. and Attachment B for DEM's; Section V.C. and Attachment D for DOQ's.

2.) Please provide all information requested in the Section IV worksheet for each type of data proposed, and attach the worksheet to the technical proposal.

B. Submittal of Element 1 Proposals

1.) Element 1 Technical Proposal Instructions

a.) The proposal must provide sufficient information and detail to permit evaluation based on the factors listed in Section II.C. The proposal should include:

1.) Cover page specifying an Element 1 proposal to prepare new DLG's (specify categories and/or NHD), DEM's, or DOQ's, and including the announcement number - 00HQPA0007.

2.) Table of contents, diagrams and exhibits.

3.) The total number of digital files being captured.

4.) Project diagram(s). The southeast map corner coordinates (latitude/longitude in degrees, minutes, and seconds) should be labeled for at least one map in each proposal diagram.

5.) Brief abstract describing the overall approach.

6.) A sample digital data file of the data type proposed.

b.) The proposal should be complete and specific to the work proposed, explain how USGS technical requirements for DLG's, DEM's, or DOQ's, will be addressed, and demonstrate that the applicant has access to the resources needed to accomplish the work proposed. The application should include:

1.) A summary of the applicant's experience in capturing, editing, processing, and transferring digital geospatial data.

2.) A description of the digital geospatial data being captured to meet the applicant's needs, and how it differs from corresponding USGS products.

3.) A description of additional work the applicant proposes to perform in order to meet USGS technical standards for DLG's, DEM's, DOQ’s, or NHD (Section V.A., V.B., or V.D. and Attachment A, B, C, or D).

4.) A discussion of procedures to be used to ensure that proposed digital geospatial data meets USGS standards, including methods used for quality control and determining positional accuracy.

5.) A description of data collection hardware (including scanner or digitizer resolution and accuracy), editing and plotting procedures, and software (including vendors and versions) that would be used in capturing and processing DLG, DEM, DOQ, or NHD data.

6.) A description of ground control and aerotriangulation procedures used in preparing DOQ's and photogrammetric DEM's.

7.) A description of materials and services proposed to be provided by each party to the proposed agreement, and schedules for deliveries or performance.

NOTE: Scale-stable USGS source graphics or other graphics and digital files should be specified for Element 1 DLG proposals and for DEM proposals where data are derived from scanned hypsography. Element 1 DOQ's and photogrammetric DEM's should be derived from aerial photography consistent with NAPP product and camera specifications (Section V.E.).

2.) Element 1 Cost Proposal Instructions

Element 1 cost proposals should document the additional incremental costs to be incurred by the applicant in preparing the data to full USGS standards. These costs should relate to the number of USGS primary series maps (or quarter-quads for DOQ's) in the proposal and to specific DLG data layers if applicable. Recipients will be reimbursed based on actual costs incurred, not unit price per data type.

Cost data to support the proposed Federal funding requested in block 15 of the SF-424 (Attachment J) must be provided to the Contracting Officer. To help expedite analysis of the application, the following cost information should be addressed as applicable:

a.) Personnel. Identify categories of salaries and wages, and the estimated number of hours required to meet full USGS requirements.

b.) Fringe Benefits. Explain what costs are covered in this category and the basis for rate computations. If rates are audit approved, include a copy of the audit agreement and/or the name of the audit agency.

c.) Travel. State purpose of the trip and itemize the estimated travel costs (i.e. provide proposed per diem amounts and mileage rates).

d.) Equipment. Federal funds awarded under this announcement are not intended to support the purchase of capital equipment.

e.) Supplies. Include the cost of any materials or supplies needed to prepare and provide deliverable digital data files to USGS.

f.) Contractual. Any consulting or contractual services to be performed under the proposed award should be detailed in the same format as the applicant's labor costs in (a) and (b) above.

g.) Construction. Not applicable.

h.) Other Direct Costs. Include other costs not identified elsewhere such as shipping, computer processing, telecommunications and supplies, equipment use charges, etc. Show how these costs were estimated and how they relate to DLG, DEM, or DOQ preparation.

i.) Total Direct Charges. Total for items a - h above.

j.) Indirect Charges. Show proposed fixed or ceiling rates for overhead, general and administrative (G&A) costs, and indicate the total estimated indirect charges related to DLG, DEM, or DOQ preparation. If applicant has separate rates for recovery of labor overhead and G&A costs, each rate should be identified. A copy of the approved rate agreement if available should be submitted. Profit/fee will not be allowed.

k.) Totals. Total for items (i) and (j) above.

Any costs incurred prior to official award of a Cooperative Agreement, under this Program Announcement, are at the risk of the potential recipient.

C. Evaluation of Element 1 Proposals

1.) A USGS review panel will evaluate Element 1 proposals to determine relevance and technical merit, logical and physical formats of sample digital data files, and the reasonableness of the applicant's estimated incremental costs to generate data to full USGS standards, i.e., costs over and above those to prepare data to meet the applicant's requirements.

2.) Proposals will be evaluated based on the following factors.

a.) Relevance. Proposals which support the National Mapping Divisions' goals described in the introduction of this announcement are considered relevant - particularly those which support the development enhancement, and maintenance of a National Digital Geospatial Data Framework. Most support will be limited to areas of the U.S. where proposed products have not been collected by USGS, and are not in work at present. Current status information about DLG, DEM, and DOQ, data are available from the following website (Attachment G): http://mapping.usgs.gov/www/products/status.html . This information is subject to change, and the USGS will assess relevance using the latest data available. NHD standards and relevant information can be found at: http://mapping.usgs.gov/standards/index.html (attachment C).

b.) Data compatibility. The degree to which the applicant's approach in preparing digital geospatial data to meet their own needs complements USGS requirements will be evaluated. The applicant's internal data needs should be compatible with USGS requirements regarding source materials, positional accuracy, feature content, attribute coding, projection and datum, header information, file extent and output format as described in Sections V.A., V.B., V.C., and V.D. Compatibility will be negotiated with applicant and can be further defined and refined during evaluation.

c.) Technical Approach. The degree to which the proposal reflects an understanding of procedures necessary to prepare digital map or image data to full USGS standards will be evaluated.

1.) Hardware and software proposed must be deemed capable of accurate data capture with minimal errors.

2.) Processing software proposed must be capable of performing (as applicable) data transformations, gridding, topological structuring, space resectioning, radiometric contrast stretching, mosaicking, edge matching, formatting, and quality checks to produce a data file meeting USGS standards as detailed in Section V.A., V.B., V.C., or V.D. and Attachments A, B, C, or D.

3.) The applicant must have access to hardware adequate to meet the requirements of data editing, error analysis, and verification of the horizontal or vertical accuracy of the data (i.e., hard copy proof plotting or a comparable method for visual comparison of the digital file with the source graphic or photograph).

d.) Period of Performance. The applicant should demonstrate that resources and capacity are adequate to meet the proposed work schedule. Generally, data prepared under a cooperative agreement should be delivered to the USGS within a year after the agreement is signed, but proposals for multiple-year agreements or option-year provisions will be considered.

e.) Experience. The applicant's previous experience in preparing digital geospatial data (as detailed in the technical proposal) will be evaluated to assess basic capability to support complex, multi-task digital production activities.

f.) Reasonableness of Proposed Cost. This factor evaluates whether the costs identified to prepare digital data to full DLG (including NHD), DEM, or DOQ standards are consistent with USGS experience, and whether the proposed cost to USGS is in the public interest.

1.) The applicant's cost estimate should reflect the procedures and level of effort described in the proposal.

2.) The USGS will weigh the applicant's estimated costs against other USGS costs for source materials, technical assistance, data validation, etc., to determine whether the proposed cost is in the public interest and conforms with public law.

g.) Requirements. The extent to which the proposal supports USGS' documented mapping requirements will be assessed. Requirements from other Federal and State agencies may be a key factor if USGS funds are not sufficient to support all otherwise acceptable proposals.

III. ELEMENT 2: PROPOSALS FOR COOPERATIVE AGREEMENTS TO OBTAIN EXISTING PRIMARY SERIES DIGITAL CARTOGRAPHIC DATA

A. General Element 2 Instructions

1.) Applicants must submit test sample data for evaluation.

2.) Applicants must be able to provide vector data and digital elevation files in 7.5-minute USGS quadrangle coverages for the conterminous United States, or in 1:63,360-scale USGS map coverages for Alaska. Applicants must be able to provide digital raster graphic data for standard USGS quadrangle maps for the United States. Applicants must be able to provide digital orthophoto data registered to 3.75-minute quarter-quadrangles.

3.) Please provide all information requested in the Section IV. worksheet for each type of data proposed, and attach the worksheet to the technical proposal.

B. Submittal of Element 2 Proposals

1.) Element 2 Technical Proposal Instructions

a.) The proposal must provide sufficient information and detail to permit evaluation based on the factors listed in Section III.C. The proposal should include:

1.) Cover page specifying an Element 2 proposal to provide existing primary vector data (specify DLG categories), digital elevation data, digital raster graphic data, or digital orthophotos, and including the announcement number - 00HQPA0007.

2.) Table of contents, diagrams, and exhibits.

3.) The total number of digital files included in the proposal.

4.) Project diagram(s) identifying the southeast map corner coordinates (latitude/longitude in degrees, minutes, and seconds) for at least one map in each proposal diagram.

5.) Brief abstract of the proposal.

6.) A sample digital data file of the data type proposed.

7.) A technical description of the existing vector data, elevation data, digital raster graphic data, or digital orthophotos and how they were captured, edited and formatted.

Vector Data:

- Describe the source graphic, feature content, attribute coding scheme, positional accuracy (and how this is determined), topology (if applicable), edge matching (if applicable), hardware and software (including vendors and versions) used in data collection, editing and processing, file format and header information.

- Discuss equipment resolution and accuracy, data registration, projection (UTM, State Plane, etc.) and datum, degree of filtering or feature generalization, processing algorithms, editing routines.

Digital Elevation Data:

- Describe source materials (aerial photographs or contour separates), ground control design and aerotriangulation, scanning, gridding, and editing procedures, hardware and software used for data collection and processing, projection and datum, testing procedure used to determine vertical RMSE, elevation data file format and header information.

Digital Orthophotos:

- Describe the digital orthophoto file format (including header information, areal extent and image overedge), scanning and ground resolution, coordinate systems and datum used, source photography and aerial camera system, hardware and software used for scanning, editing, mosaicking, etc., and control point layout.

2.) Element 2 Cost Proposal Instructions

Element 2 cost proposals should relate the applicant's valuation of the proposal data to the number of USGS primary series maps (or orthophoto quarter-quads) for which data has been collected, and to specific DLG data layers or NHD cataloging units for vector data. Any costs for reformatting and transferring the data to USGS also should be identified. Recipients will be reimbursed based on actual costs incurred, not unit price per data typeS.

Cost data to support the proposed Federal funding requested in block 15 of the SF-424 (Attachment J) must be provided to the Contracting Officer. To help expedite analysis of the application, the following cost information should be addressed as applicable:

a.) Personnel. Identify categories of salaries and wages, and the estimated number of hours required to meet full USGS requirements.

b.) Fringe Benefits. Explain what costs are covered in this category and the basis for rate computations. If rates are audit approved, include a copy of the audit agreement and/or the name of the audit agency.

c.) Travel. Not applicable under Element 2.

d.) Equipment. Federal funds awarded under this announcement are not intended to support the purchase of capital equipment.

e.) Supplies. Include the cost of any materials or supplies needed to prepare and provide deliverable map data files to USGS.

f.) Contractual. Any consulting or contractual services to be performed under the proposed award should be detailed in the same format as the applicant's labor costs in (a) and (b) above.

g.) Construction. Not applicable.

h.) Other Direct Costs. Include other costs not identified elsewhere such as shipping, computer processing costs, telecommunications and supplies, equipment use charges, etc. Show how these costs were estimated and how they relate to preparation of deliverables.

i.) Total Direct Charges. Total for items a - h above.

j.) Indirect Charges. Show proposed fixed or ceiling rates for overhead, general and administrative (G&A) costs, and indicate the total estimated indirect charges related to preparation of deliverables. If applicant has separate rates for recovery of labor overhead and G&A costs, each rate should be identified. A copy of the approved rate agreement if available should be submitted. Profit/fee will not be allowed.

k.) Totals. Total for items (i) and (j) above.

Any costs incurred prior to official award of a Cooperative Agreement, under this Program Announcement, are at the risk of the potential recipient.

C. Evaluation of Element 2 Proposals and Test Sample Data

1.) A USGS review panel will evaluate proposals to determine relevance and technical merit.The panel will assess the reasonableness of the applicant's cost proposal following evaluation of sample data.

2.) Element 2 proposals will be evaluated based on the following factors:

a.) Relevance. USGS support for Element 2 proposals generally is limited to areas where standard USGS digital products have neither been collected, nor are in work at present. Current status information about DLG, DEM, and DOQ, data are available from the following website (Attachment G):

http://mapping.usgs.gov/www/products/status.html. This information is subject to change, and the USGS will assess relevance using the latest data available. NHD standards and relevant information can be found at: http://mapping.usgs.gov/standards/index.html (Attachment C).

b.) Extent. The USGS generally will not support proposals involving fewer than twenty (20) USGS primary maps, or eighty (80) 3.75-minute digital orthophotos. Proposals for fewer data files may be considered for areas of specific interest to USGS, or if there are prospects for more extensive coverage in the future.

c.) Technical Approach. The degree to which the data characteristics described in the proposal reflect the procedures necessary to capture accurate digital map data will be evaluated.

1.) Existing vector data should be derived in large part from USGS primary series maps; scale stable source materials (film or mylar) are preferred. For photogrammetric digital elevation data and digital orthophotos, photography and control must be adequate to capture data meeting USGS accuracy standards. For digital raster graphic data, scanning from paper-based published maps is acceptable because of the resampling and projection transformations required.

2.) Hardware and software described must be deemed capable of accurate data capture with minimal errors.

3.) Processing software must be judged suitable to permit (as applicable) adequate data transformations, gridding, topological structuring, space resectioning, radiometric contrast stretching, mosaicking, edge matching, formatting and quality checks to produce accurate vector data, elevation data, or digital orthophotos.

4.) The applicant's output file format must be suitably compatible with USGS DLG, DEM, DLG, and DOQ formats to permit proof plotting of sample vector data, and to allow viewing of all data types on a workstation to verify data content and accuracy. Acceptable vector data transfer formats include: DLG-O/S; ARC Export; IGES (FIPS Std.); IGDS (Intergraph); DXF (AutoCAD); Altek Raw; DGN (Intergraph). For elevation data, raster graphic, and digital orthophotos, applicants should identify specific interchange formats they can support.

5.) USGS requires applicants to submit sample digital data files as part of their proposal package. Sample data will be evaluated for:

d.) Compatibility. The applicant's existing data should be compatible with USGS requirements for DLG's (including NHD), DEM's, and DOQ's in regard to source materials, resolution, positional accuracy, feature content, attribute coding consistency, projection and datum, header information, file extent and output format as described in Sections V.A., V.B., V.C., V.D., and V.E.

Note: Sample elevation data files should be accompanied by a list of test points used to verify accuracy.

e.) Requirements. The extent to which the proposal supports USGS' documented mapping requirements will be assessed. Requirements from other agencies may be a significant factor in awarding agreements to obtain proposal data.

3.) If the sample digital data files are found technically acceptable, the review panel will next address the applicant's cost proposal. A matrix will be used to determine the level of effort USGS would save by obtaining the applicant's data, and to estimate the additional effort required for USGS to convert the data to full DLG, NHD, DEM, or DOQ standards. From this information the USGS will develop an estimated valuation of the applicant's data to guide negotiations for obtaining the data for the public domain at a fair and reasonable cost.

IV. PROPOSAL DATA CHARACTERISTICS WORKSHEETS

A. DLG/Vector Data Worksheet

1.) Physical Format: (DLG-O; DXF; ARC EXPORT; other-specify)

2.) Unit of Coverage: (7.5-minute USGS map; other-specify)

3.) Source Material: (Stable film or mylar USGS map; published USGS paper map; other-specify; source combinations?)

4.) If other sources are used, can USGS map features be identified explicitly?

5.) Source scale: (1:24,000; 1:25,000; 1:63,360; other-specify)

6.) Coordinate System:

Projection - UTM; State Plane; Geographic; other-specify
Horizontal Datum - NAD 27; NAD 83 **Same as source map?**
Coordinate Units - Meters; Inches; Feet; Other-specify

7.) DLG Category: __Boundaries __Hydrography
__Transportation __Hypsography

8.) Does each file represent a single USGS base category?

9.) Are all mapped features captured for each base category? (See Attachment A)

10.) Feature element types captured: (Lines, Nodes, Areas, Point Features)

Please attach a listing of all feature attribute codes you use to tag digitized map features, by DLG category and element type, see USGS NMPTI.

11.) What is the positional accuracy for well-defined test points?

12.) Is the digitized vector data topologically structured?

13.) Are digitized features edgematched/aligned with features on adjacent maps?

14.) Would a standard header containing USGS-required content be provided, or is header information available in another form?

15.) Digitizing hardware (Company, platform, and model)

16.) Processing Software (Company, series, and version)

B. Digital Elevation Data Worksheet

1.) Physical Format: (DEM; TIN; GRASS; RDEF; other-specify)

2.) Unit of Coverage: (7.5-minute USGS map; other-specify)

3.) Method of generation: (Gridding of digitized map contours; profiling aerial photographs, stereomodel digitizing; other-specify)

For profile or stereomodel DEM's derived from other than NAPP photography, complete the aerial photography worksheet following (IV.E.).

4.) Scale: (1:24,000; 1:25,000; 1:63,360; other-specify)

5.) Coordinate System:

Projection - UTM, State Plane, Geographic, other-specify
Horizontal Datum - NAD 27, NAD 83
Vertical Datum - NGVD 29; NAVD 88
Coordinate Units - Meters; Feet

6.) Elevation Profile Orientation: (South-North/West-East; West-East/North- South; other-specify)

7.) Elevation Point Spacing: (30-meter; 1 arc-second; other-specify)

8.) Accuracy Description: (RMSE; other-specify; per file?)

Please attach a description of the ground control design and aerotriangulation procedures used in preparing photogrammetric DEM's.

9.) Would a standard header containing USGS-required content be provided, or is header information available in another form?

10.) Digitizing/profiling hardware: (Company, platform, and model)

11.) Processing Software: (Company, series, and version)

C. Digital Orthophotoquad Worksheet

1.) Physical format: (raw; TIFF; GIF; other-specify)

2.) File extent: (3.75' x 3.75'; other-specify)

3.) Are the data available uncompressed?

4.) If not, what compression method has been applied?

5.) Photo source: (NAPP; Other)

If other than NAPP, please complete the aerial photography worksheet following (IV.E.).

6.) Number of bands

7.) If color infrared, file organization: (BSQ; BIL; BIP)

8.) Coordinate system:

Projection - UTM; State Plane; Geographic; other-specify
Horizontal Datum - NAD 27; NAD 83

9.) Orientation of image pixels: (West-East/North-South; other-specify)

10.) Scanning aperture in microns: (32 or less; >32)

11.) Ground/pixel resolution: (1-meter; 0.5-meter; other-specify)

12.) What is the positional accuracy for well-defined test points?

13.) Corner ticks embedded: (NAD 83 and NAD 27; NAD 83 only; NAD 27 only; neither)

14.) Images overedges beyond outermost corner ticks: (50-300 meters; other- specify)

15.) Source of elevation data used for orthophoto rectification?

16.) Vertical RMSE of elevation data?

Please attach a description of the ground control design and aerotriangulation procedures used in preparing DOQ's.

17.) Will a standard header with USGS-required content be provided, or is header information available in another form?

18.) Scanning hardware (Company, platform, and model)

19.) Processing Software (Company, series, and version)

D. Aerial Photography Worksheet

COMPLETE ONLY IF SOURCE PHOTOGRAPHY IS OTHER THAN NAPP

1.) Aerial camera make:

2.) Aerial camera lens number:

3.) Aerial camera magazine number/platen ID number:

4.) USGS camera calibration report number and date:

5.) Camera owners:

6.) Aerial Film Type: (Black & White; Color IR)

7.) Aerial film manufacturer and series:

8.) Date(s) of photography:

9.) Sun angle above horizon:

10.) Vegetation condition: (Leaf-on; leaf-off)

11.) Forward overlap (%): Sidelap (%):

12.) Scale: (1:40,000; 1:30,000; 1:24,000; other-specify)

V. TECHNICAL DESCRIPTION FOR DIGITAL LINE GRAPHS, DIGITAL ELEVATION MODELS, DIGITAL ORTHOPHOTOQUADS, AND AERIAL PHOTOGRAPHY

This section applies specifically to cooperative agreements to prepare new DLG, DEM, or DOQ data (see Section II, Element 1), and includes guidelines for source photography used to prepare DEM's and DOQ's. These technical descriptions also are generally applicable to existing primary series vector, elevation, raster graphic, and orthophoto data as described in the Section III, Element 2 proposal instructions and evaluation procedures.

A. Digital Line Graphs (DLG)

1.) General DLG Data Requirements

New data prepared under this announcement will be provided to USGS as fully attributed, category-specific DLG level 3 data files, in Optional format, in the UTM projection and coordinates. The data must meet feature content, structure, attribute coding, accuracy, metadata, and format requirements appearing in USGS NMPTI, Standards for Digital Line Graphs, Parts 1, 2, 3 version date 7/98, and subsequent amendments, referenced as Attachment A. Other mutually agreed upon vector data formats may also be provided to USGS.

The recipient must use digitizing tables, automated scanning or line following devices to capture feature data from mylar or other stable-base source graphics. The recipient must be able to manipulate the data to perform graphic editing, coordinate-system conversion, changes of projection, map subsetting by area (windowing), merging of data files within these sub-areas, and edge matching (if applicable). Other requirements include quality control and error analysis, hardcopy proof plotting (or comparable procedure for visual comparison of the DLG file with scale stable digitizing source graphic), and output to tape or other digital storage media.

2.) DLG Data Capture

a.) Registration, Data Transformation, and Projection

1.) At minimum, the four map neat line corners appearing on the scale- stable source graphic will be used as registration ticks for converting table coordinates to earth coordinates.

- A precise algorithm for converting X-Y digitizer units to earth coordinate values will be used to register the digitized data. Mathematical deviation measured as a standard error, of the transformed coordinates for the source graphic registration ticks will be no greater than 0.003 inch. Mean deviation in both X and Y directions must be within 0.003 inch.

- All registration parameters including X-Y values, earth coordinate values of transformed data, and computed error figures must be preserved in electronic storage and output as part of the listing included with each deliverable.

- Completed digital map files shall be transformed from table coordinates into a UTM coordinate system using precise algorithms, such as the USGS General Cartographic Transformation Package (GCTP) or equivalent.

b.) Technical Digitizing Requirements

1.) Content: All map features appearing on the source graphic for the DLG layer being digitized shall be included in the delivered DLG file.
Each feature category data layer shall be provided as a discrete DLG file.

2.) Accuracy:

- The DLG positional error shall be less than or equal to 0.003 inches standard error in both the x and y component directions, relative to the digitizing source. Linear features shall be digitized with sufficient point density to preserve the curvilinear quality of the feature as represented on the scale-stable source graphic; 800-1,000 dots-per-inch is recommended.

3.) Attributes: Attributes will conform to Standards for Digital Line Graphs (Attachment A, Part 3).

4.) Polygon data: All polygons will be defined during topology creation. The last coordinate pair must be mathematically equal to the first coordinate pair for all coordinate strings enclosing a polygon. All polygons intersecting an area or project border must be completed at the border.

5.) Linear data: All lines shall be a set of sequentially numbered coordinate pairs. No duplication of points may occur consecutively in a data string. Straight-line segments shall be defined by beginning and ending points only. Intersecting lines must be separated into individual line elements by positioning a node at the point of intersection.

6.) Point data (degenerate lines): All point data shall be represented by two sets of coordinate pairs, each with the same coordinate values and whose line length is zero.

7.) Node data: All node data shall be represented by a single coordinate pair.

8.) Confluences: All confluences of line features (linear or polygon data) must be identical or coincident, i.e., no over- or undershoots are permitted. Lines that connect polygons must intersect those polygons precisely, i.e.; every end point must be an intersection point of the respective polygon.

9.) Edge joins (optional): All linear, point, and Arial data, including lines that form polygons, must be edited to effect a transition across map borders (i.e., features located on adjacent map sheets must tie exactly at the map border within the digitizing project). Where map features are discontinuous beyond 0.020 inches on adjacent scale-stable source graphics, or where map symbology is inconsistent, such features shall be digitized as shown on the map.

NOTE: The recipient may elect not to edge join the data across project map boundaries, as long as this is specified in the technical proposal. The omission of this task by the recipient should be reflected in the proposed cost to USGS.

10.) Duplicate features: No duplicate features are allowed in the output files.

11.) File structure: The level of topological structuring with appropriate records for

nodes, lines, areas, and associated pointers shall conform to standards for DLG-Optional (DLG-O) format as described in

c.) Standards for Digital Line Graphs (Attachment A)

l.) Digital Data Files: All data files, once through the editing and polygon completion phases, are to be prepared as DLG-O format and structure. Data shall be provided as category-specific files, which correspond to DLG categories as described in Standards for Digital Line Graphs (Attachment A). Data deliverables shall be readable using standard transfer procedures.

2.) If delivered on magnetic tape, it is preferred that DLG files be delivered on 8-mm helical-scan, or 3480 cartridge tape. Each tape shall contain one or more map files, but a file may not be divided between two tapes. The last data file on tape shall be terminated by a USA standard end-of-tape mark (double end-of-file marks). Each tape will be marked or labeled to indicate the primary series maps to which the data pertains, and accompanied by a listing of files in the order they appear on the tape.

Note: Other transfer media, such as CD-ROM or Internet FTP, may be proposed and will be considered during the technical evaluation.

d.) Quality Control and Editing Requirements

1.) The recipient must be able to edit digital map feature and attribute data to correct errors detected during quality control. All edited files must meet accuracy standards as specified in this work statement and in Standards for Digital Line Graphs (Attachment A).

2.) All digitized map data shall be inspected by the recipient and all errors corrected prior to delivery to USGS. This will require generation of hard copy verification plots or use of a comparable method for visual comparison of the DLG file with the scale stable source graphic. A USGS technical contact will be designated to resolve recipient questions concerning DLG source materials (GFM), production and editing procedures, and USGS DLG standards.

B. Digital Elevation Models (DEM)

1.) General DEM Data Requirements

New DEM data prepared under this announcement will be provided to USGS as either Level 1 or Level 2 DEM data files, and must meet content, structure, geometric accuracy, metadata, and format requirements as specified in USGS NMPTI Standards for Digital Elevation Models, Parts 1, 2, and 3 issued 12/92 (and subsequent amendments), referenced as Attachment B. The USGS will evaluate DEM proposals involving other methods that do not conform to either the Level 1 or Level 2 approach, but the applicant must demonstrate that deliverables will meet USGS DEM standards.

Although different procedures are used for collecting Level 1 versus Level 2 DEM's, both processes (and any alternatives proposed) must result in DEM's suitably accurate to support preparation of 3.75-minute (quarter-quad) DOQ's meeting National Map Accuracy Standards (NMAS) at 1:12,000 scale.

Level 1 DEM's are derived from manual profiling or image correlation of aerial photographic stereomodels. The production system must generate a DEM with vertical accuracy of 7 meters RMSE or less when compared to elevations established by ground surveys or aerotriangulation (as opposed to map control interpolated from USGS or other published maps).

Level 2 DEM's are derived from hypsography (contour) digitizing, either from USGS primary map separates or photogrammetrically (stereomodel digitizing). In areas of complex relief, it may also be necessary to digitize hydrography.

If the proposal seeks USGS assistance to prepare Level 2 DEM's from hypsography DLG's, then the recipient must demonstrate the capability to meet the DLG requirements appearing in Section V.A. and Attachment A. DEM's derived from hypsography have an RMSE of less than or equal to one-half the contour interval of the corresponding USGS primary series base map.

Level 2 DEM's generated through stereomodel digitizing must be prepared using equipment and/or procedures (e.g. C-factor, dropping spot/point elevations) sufficient to capture DEM's having vertical RMSE not exceeding 7 meters.

The recipient must be able to perform coordinate-system conversion, changes of projection, file subsetting by area (windowing), merging of data files within these sub-areas, and edge joining (optional). Other requirements include quality control editing and error analysis, the capability to perform polygon edits (for water bodies, double line streams, swamps) and to regrid selected areas within the DEM. Resources should include imaging graphics workstations and viewing software to allow manipulation and editing of gridded data (e.g., shaded relief or color enhancement, simulation of contours, perspective viewing), and the capability to output DEM data to tape or other digital storage media.

2.) DEM Data Capture

a.) Registration, Data Transformation, and Projection

1.) The four geographic, standard USGS quadrangle corners shall define the latitude and longitude bounds of a given DEM file; if converted to the UTM coordinate system (as for 7.5-minute DEM's), then recording precision shall be to the nearest thousandths of a ground meter (0.001 meter).

2.) Transformation from table coordinates into a UTM coordinate system will be performed using precise algorithms, such as the USGS General Cartographic Transformation Package (GCTP) or equivalent.

3.) Technical Digitizing Requirements

a.) Content: The DEM shall consist of elevation values ordered at regularly spaced intervals from south to north in profiles that are ordered west to east, formatted to Standards for Digital Elevation Models (Attachment B). Under Element 1, USGS will not accept irregular elevation network files as deliverables, but will consider proposals involving resampling of irregular network data to generate a DEM file that can be shown to meet USGS standards.

For the conterminous U.S., elevations are referenced horizontally to the UTM coordinate system on NAD 27 or NAD 83; spacing of the elevations along and between each profile is 30 meters. The unit of coverage is the 7.5-minute quadrangle, i.e., the 1:24,000- or 1:25,000-scale primary series map.

For Alaska, elevations are referenced horizontally to the geographic (latitude/longitude) coordinate system on NAD 27 or NAD 83. Elevation spacing along the south to north profiles is 2 arc-seconds, with 3 arc-seconds between profiles. The unit of coverage corresponds to the Alaska 1:63,360-scale primary map.

b.) Accuracy: The DEM shall be generated using state-of-the-art production systems where source materials, control, scanning, gridding, and editing procedures are sufficiently accurate to generate elevation files having a vertical RMSE not exceeding 7 meters, or one-half the contour interval of the corresponding USGS primary series base map. Photogrammetric DEM's should reference ground control, aerotriangulation or GPS control.

Elevation grid files shall have sufficient spatial frequencies to faithfully represent the morphology and positions of ridge lines and tops, streams, and water bodies as depicted on the current USGS primary series map. Generally flat trending surfaces depicted on the map shall appear in the corresponding grid file as flat trending, and are edited to remove artifacts such as ramps, striations, star patterns or spikes.

Note: If close attention is given to all elements of the DEM production process, then accuracies of about one-half the 7-meter RMSE given as the maximum accuracy tolerance acceptable to USGS may be achieved. DEM production systems only marginally capable of producing DEM data to the maximum 7-meter RMSE tolerance will be given a lower priority for USGS support within this initiative than systems with higher capabilities.

c.) Edge Joins (optional): When the DEM is used in conjunction with DOQ production, it is advisable that edges be joined and that topographic features be continuous across all DEM edges. Failure to join DEM edges may adversely impact subsequent DOQ production.

NOTE: The recipient may elect not to edge join the data across project map boundaries, as long as this is noted in the technical proposal.

d.) Digital Data Files: All data files, once through the editing and completion phases, are to be prepared as USGS standard DEM format and structure. Data shall be provided as described in Standards for Digital Elevation Models (Attachment B). Data deliverables shall be readable using standard transfer procedures.

1.) It is preferred that DEM files be delivered on 9-track magnetic, 8-mm helical-scan,

or 3480 cartridge tape. The file loading, tape marking, and file listing parameters listed in Section V.A. for DLG's also apply to DEM's.

4.) Quality Control and Editing Requirements

a.) The recipient must be capable of editing DEM gridded data in response to errors detected during quality control. All edited files must meet accuracy standards as specified in this technical description and in Standards for Digital Elevation Models (Attachment B).

b.) The recipient shall inspect all DEM grid files and all errors corrected prior to delivery to USGS. This will require use of a DEM editing system with visualization software capabilities. A USGS technical contact will be designated to resolve recipient questions concerning DEM source materials, production and editing procedures, and concerning USGS DEM standards.

C. Digital Orthophotoquads (DOQ)

1.) General DOQ Data Requirements

New data prepared under this announcement will be provided to USGS as fully archivable DOQ's. The DOQ must meet NMD requirements for content, structure, geometric accuracy, image radiometry, resolution, metadata, and format as detailed in the USGS NMPTI Standards for Digital Orthophotos, Parts 1 and 2 issued 7/92 (and subsequent amendments), referenced as Attachment D.

The recipient must use a scanning microdensitometer and a high speed, dedicated computer with the ability to process and store large (40 mb or larger) image files. Additionally, the recipient should have a graphics-capable monitor and software for image processing, including radiometric contrast adjustment, spatial enhancement, contrast stretching, histogram matching, mosaicking, filtering, masking and resampling capabilities. Other requirements include orthorectification software, quality control and error analysis, hardcopy proof plotting (or comparable procedure for visual or histogram comparison of the DOQ with the source image), and output to digital storage media.

2.) DOQ Data Capture

a.) Registration, Data Transformation, and Projection

1.) Ground control points, photographic control points, and camera calibration parameters will be used to register and orient the raw image file to the scanner and/or to the sensor, and for rectification to take place. Recipient will use 9 control points (ground control, pass points, and tie points) per orthophoto image (a minimum of 4 within each 3.75-minute quarter-quad DOQ), photo coordinates of ground control, camera calibration parameters, and line/sample numbers of the fiducial marks in the digitized photo in order to compute precise image orientation. Recipients shall use field control established by third-order or better methods; field control must be

photoidentifiable and also described by NAD 83 coordinate values and control point elevation. Horizontal control points shall have spacing every 7.5 minutes along the perimeter of a project, every 15 minutes interior.

2.) Recipient should utilize map projection transformations, which address a variety of coordinate systems and projections.

3.) The DOQ shall be cast on NAD 83, UTM projection with coordinates in meters. The primary horizontal datum shall be NAD 83. The principal secondary horizontal datum shall be NAD 27, the Puerto Rico Datum, the Old Hawaiian Datum or other approved datums.

4.) The four primary datum corner ticks for each quarter-quadrangle shall be imprinted into the image as four solid white crosses (dn = 255) and the four secondary datum corner ticks as four dashed white crosses (dn = 255). (See fig. 2-1, USGS NMPTI Standards for Digital Orthophotos.)

b.) Technical Digitizing Requirements

1.) Content: Data elements consist of processed 8-bit (256 discrete levels) image pixels oriented in lines (rows) and samples (columns). Each line contains a series of pixels ordered from west to east. The order of the lines is from north to south. The standard DOQ format is a quarter-quadrangle (3.75 minutes of latitude by 3.75 minutes of longitude) plus overedge. The amount of overedge shall range from a minimum of 50 meters beyond the extremes of the primary and secondary datum corner ticks, to a maximum of 300 meters beyond the corner ticks. The DOQ shall be oriented grid north.

2.) Source Materials

- Photography - NAPP or equivalent black & white or color-infrared photography from camera systems meeting USGS aerial camera specifications (Section V.E.) are to be the primary source used in the production of quarter-quad digital orthophotos. Camera, lens, and platen ID numbers should be identified if other than NAPP photography is used. Photographs will be scanned on a microdensi- tometer using a scanning aperture appropriate to attain an image sampling (pixel) resolution of 1 meter. Using NAPP photography, a 25-micron scanning aperture equates to an image resolution of 1 meter.

- Aerotriangulation and Field Control - Recipient shall use field control acquired by third-order class 1 or better methods, spaced sufficiently to meet NMAS for 1:12,000 scale. Aerotriangulation tie point horizontal residuals shall be less than or equal to 8.25 feet (2.5 meters) and vertical residuals shall be less than or equal to 8.25 feet (2.5 meters).

- DEM - Recipient will use USGS Level 1, Level 2, or equivalent, DEM's having an RMSE of no greater than 7 meters or one-half the contour interval of the corresponding USGS primary series base map.

3.) Accuracy: The recipient will ensure that the DOQ meets National Map Accuracy Standards (NMAS) at 1:12,000.

- The NMAS specifies that ninety percent (90%) of the well-defined points tested must fall within 33.3 feet (1/30 inch) at 1:12,000 scale.

- The accuracy of the data shall be verified by comparing image line and sample geometric coordinates to coordinates derived from higher order accuracies for the same points. Visual verification shall be performed for image completeness, to ensure that no gaps exist in either the image area or the overedge coverage.

- All input and processes used in the production of DOQ's shall be sufficiently accurate to ensure that the final product meets NMAS.

4.) Ground Resolution: Horizontal ground sample distance of a DOQ generally shall be 1 meter, with scanning resolution not to exceed 32 microns when using NAPP photography. Interpolation (resampling) of pixel resolution to a coarser resolution is allowed; conversely, extrapolation to a finer resolution than that of the source is not allowed at any larger than the 32 micron limit specified above.

5.) Image Radiometry: Image brightness values shall be represented by 256 discrete levels in the range of 0-255. The recipient shall verify via visual inspection that the image quality of the digital orthophoto is the same as or better than that of the original unrectified input image.

6.) Digital Data Files: All data files are to be prepared as standard USGS DOQ format and structure. The deliverable file will consist of ASCII header records and binary image data records as described in Standards for Digital Orthophotos (Attachment D). Data deliverables shall be readable using standard transfer procedures.

- The DOQ files shall be delivered in a format and medium agreed upon by the USGS and the recipient. The preferred medium is CD-ROM.

c.) Quality Control and Editing Requirements

1.) The recipient must be able to edit digital orthophoto data to adjust image quality and correct other errors detected during cooperator quality control. All edited files must meet NMD requirements for content, structure, geometric accuracy, image radiometry, resolution, metadata, and format as detailed in Standards for Digital Orthophotos (Attachment D).

2.) All DOQ files will be visually inspected by the recipient for image completeness, and to ensure that orthophoto image quality meets or exceeds that of the input image. All deficiencies are to be corrected prior to delivery to USGS. A USGS technical contact will be designated to resolve recipient questions concerning DOQ source materials, production and editing procedures, and concerning USGS DOQ standards.

D. Aerial Photography

The aerial photography descriptions apply specifically to proposals to prepare new DEM or DOQ data (Section II, Element 1), but also generally apply to proposals involving existing digital elevation data and digital orthophotoquads as described in the Section III., Element 2, proposal instructions and evaluation procedures.

Any proposal specifying use of National Aerial Photography Program (NAPP) photographs, as source for DOQ's or photogrammetric DEM's will be assumed by USGS to meet all photo source requirements. For proposals involving non-NAPP photography, all information requested in the Section IV.D. Aerial Photography Worksheet should be provided, and the completed worksheet attached to the technical proposal for DEM's or DOQ's.

1.) Aerial Mapping Camera

Calibrated precision aerial mapping cameras that can take aerial photographs compatible with stereoscopic mapping instruments and raster scanning devices are required. Camera systems must comply with USGS Aerial Camera Specifications, as evidenced by a current (within 36 months previous to the first date of the photographic project) USGS camera calibration test report. If other than NAPP photography is used, then camera make, camera number, lens number, magazine number/platen ID number, calibration report number and date, and camera owner should be identified.

2.) Aerial Film

a.) Black & White: The film should be Kodak Plus-X Aerographic 2402, Kodak Panatomic-X Aerographic II 2412, Agfa Aviphot PAN 150, Agfa Aviphot PAN 50 or equivalent. Kodak Double-X Aerographic 2405 and Agfa Aviphot PAN 200 films are generally not preferred, but may be acceptable depending on the area of the project. The black and white (B&W) emulsion shall be sensitive to red, green, and blue wavelengths. The film shall have an extended red sensitivity to approximately 720 to 750 nanometers. The film shall be polyester base material with nominal thickness of 4 mils.

b.) Color Infrared: The film should be Kodak Aerochrome Infrared SO 134, 2443 or equivalent, whichever is most appropriate for the altitude being flown. For altitudes over 15,000 ft., SO 134 is generally preferred. The color infrared (CIR) emulsion shall be sensitive to the visible and near infrared spectrum from 400 to 900 nanometers. The film shall be polyester base material with a nominal thickness of 4.8 mils and shall have three gelatine layers containing silver halide, one layer to be sensitive to infrared light, one to be sensitive to green light, and the other to be sensitive to red light.

3.) Photographic Operations

a.) Time of Photography: Photography shall be undertaken when the sun angle above the horizon is 30 degrees or greater, there is no atmospheric haze, and the lighting and weather conditions are suitable for obtaining acceptably exposed film. Special care must be taken to minimize shadows in mountainous and canyon areas. For areas of extreme relief, a sun angle of 45 degrees or greater is desirable, especially where color infrared film is being used. For each project, the applicant should state whether the photocoverage was flown during a leaf-on or leaf-off condition and identify the date or date range (month-day-year) for the project.

b.) Tilt: Care shall be taken to keep tilt (departure from the vertical) of the camera to a minimum. Tilt shall not exceed 4 degrees, nor average more than 2 degrees, in any 10-mile/16km section of a flight line, nor average more than 1 degree for the entire project.
c.) Stereoscopic Coverage: The project area shall be stereoscopically covered by successive and adjacent overlaps of photographs whose imagery is located within the usable portion of the field of the lens. The forward overlap for successive frames should be at least 60 percent, and sidelap of frames in adjacent flight lines should be at least 30 percent. Orientation of flight lines for a project need not be confined to North-South. The applicant should be able to supply flight line diagrams, film roll and exposure numbers for all project photography.
d.) Scale: The nominal scale of the source photography should be identified, along with the flight height and camera lens focal length for reference. Photography used to prepare quarter-quad DOQ's should be 1:40,000 scale or larger, but there is no requirement that the photography be quarter-quad centered.

4.) Film Processing

a.) Image Quality: The imagery on the aerial film shall be clear and sharp and evenly exposed across the format. The film shall be free from clouds and cloud shadows, smoke, haze, light streaks, snow, flooding, excessive soil moisture, static marks, shadows, tears, crimps, scratches, and other blemishes. Allowance may be made for unavoidable shadows, permanent snow fields, or for reflectance from water bodies. It must be possible to produce duplicate negatives from original B&W films, and duplicate positives, or B&W internegatives from original CIR films with no significant loss of image detail.

b.) Exposing and processing aerial film: All aerial film shall be processed under controlled conditions in automatic, continuous-film processors. The final product may be an image map; therefore, the density and physical quality of the film are critical to the image map quality.

c.) Densitometry: The density units defined in these specifications are for those measured on a transmission densitometer with a scale range of at least 0.0 to 3.0 and using a 1-mm aperture probe. Readings should not be made closer than 1 inch (25 mm) to an exposure edge nor closer than 1.5 inches (40 mm) to an exposure corner. Specular reflectors (such as

water surfaces) or small, isolated density anomalies within a scene shall not be used for determining the maximum or minimum densities or density range of a roll of film or flight line.

1.) Color Infrared: All CIR film shall be exposed and processed to the manufacturer's specifications. Modified or non-standard processing is discouraged. All minimum (D-min) and maximum (D-max) densities as measured on the original aerial film positives with the film emulsion up and using status A filters should fall within the range of values provided below. All density values include the Base + Stain value.

Filter	D-min	D-max
Red	0.75 +/- .10	1.65 +/- .10
Green	.55 +/- .10	2.25 +/- .10
Blue	.55 +/- .10	2.25 +/- .10

The density aim point for farm crops and meadows using the green filter should be 1.30 to 1.90, for leaf-on deciduous forests 1.80 to 2.30 and for coniferous forests 1.35 to 2.10.

2.) B&W. B&W panchromatic film shall be exposed and processed to obtain a minimum density (D-min) of not less than 0.30 density units above base plus fog, nor greater than 0.60 density units, including base plus fog. The film shall be processed to a gamma of 1.50, adjustable to a gamma of 1.60 for terrain lacking in contrast, and adjustable to a gamma of 1.40 for high-contrast terrain. The average scene negative density range shall be 1.00. Film that does not achieve the 1.00 density range may be acceptable in areas of low natural contrast.

3.) Base plus fog shall not exceed 0.20 density unit for any type of panchromatic film and processing combination used. For other types of films, the manufacturer's predicted base-plus-fog level for a given gamma will serve as an acceptable criterion.

d.) Color shifts in CIR films. When the relative humidity of the top layer of CIR film (cyan-infrared sensitive layer) is altered as a result of dessication (drying out), there is a corresponding upward shift in color balance, and loss of infrared sensitivity. This shift is evidenced by a pronounced cyan cast throughout the resulting image. Occurrence of this problem is generally identified as Flight Line Syndrome (FLS). When FLS is suspected, or when any other type of color shift is observed, the Government shall compare the questionable frames with previous CIR imagery of acceptable quality, of the same film type, over similar terrain. This may include comparisons of the questionable film with acceptable images from the same roll, or other films taken with the same camera or like cameras on the same project, in the same season. If it is determined that the color shift evident in the film is not representative of the area and the terrain/vegetation types photographed, the government may reject the films for use in DOQ production.

VI. ATTACHMENTS

Attachment A- National Mapping Program Technical Instructions, *Standards for Digital Line Graphs*, Parts 1, 2, and 3*
Attachment B- National Mapping Program Technical Instructions, *Standards for Digital Elevation Models*, Parts 1, 2, and 3*
Attachment C- National Mapping Program Technical Instructions, *Standards for National Hydrography Dataset*, Part 1*
Attachment D – National Mapping Program Technical Instructions, *Standards for Digital Orthophotos*, Parts 1 and 2*
Attachment E - Reserved
Attachment F – Reserved
Attachment G -Availability of USGS Geospatial Data and Aerial Photography Products**
Attachment H – Special Terms and Conditions
Attachment I – General Terms and Conditions
Attachment J – Federal Assistance, SF 424 and Instructions
Attachment K - Reserved
Attachment L – Assurances (Non-Construction Programs) SF 424B
Attachment M – Request for Advance or Reimbursement, SF 270
Attachment N - Financial Status Report, SF 269A and Instructions
Attachment O – Mailing List Form
Attachment P – Certifications for Federal Assistance

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*Attachments A, B, C, and D are National Mapping Program Technical Instructions or Factsheets. Prospective applicants may access and download the pertinent digital files via Internet:

Internet address: http://mapping.usgs.gov/standards/index.html

**Attachment G displays the Availability of USGS Geospatial Data and Aerial Photography Products. Prospective applicants may access and download the pertinent information via Internet:

Internet address: http://mapping.usgs.gov/www/products/status.html